

**REMARKS**

Claims 1-30 were previously pending in this application. By this application, Applicants amend claims 1-9, 13, 14 and 19, cancels claims 10-12 without prejudice or disclaimer, and add claims 31-61. As a result, claims 1-9 and 13-61 are pending for examination, of which claims 1, 22, 24, 25, 38, 45 and 53 are independent. No new matter has been added.

**1. Preliminary Amendment Filed**

Applicants filed a Preliminary Amendment on September 3, 2004 (copy enclosed) that added claims 26-30 shown above, as evidenced by the enclosed copy of the return receipt postcard. As the Office Action did not address these claims, Applicants respectfully submit that, should a next Office Action be issued, the Office Action should be non-Final as it must address claims 26-30 for the first time.

**2. Claims 1-9, 14, 20, 21 and 25 Satisfy the Requirements of §112, Second Paragraph**

Claims 1-9, 14, 20, 21 stand rejected under 35 U.S.C. §112, second paragraph because they are purportedly unclear if consideration is not given to the letters recited in them. However, Applicants submit that such reference characters actually add clarity to the claims, particularly by providing antecedent basis that is easy for a reader to follow and understand. The Office Action asserts that it is unclear what function is to be performed when the same reference letter is used in different claims. However, same reference letters are only used in different dependent claims that do not depend from one another, so there is no lack of clarity as to what limitation is being referred to by the letter in each claim. Same letters are used in different dependent claims to preserve the proper alphabetical order between letters used in the independent claims and their dependent claims; otherwise, there would be gaps between letters used in the dependent claims and those used in the independent claims, which would make these claims unclear.

In view of the foregoing, Applicants respectfully submit that claims 1-9, 14, 20, 21 are clear and satisfy the requirements of 35 U.S.C. §112, second paragraph, and request that the rejection of these claims under this section be withdrawn.

3. **Claims 1-9, 13-21 and 26-37 Patentably Distinguish Over Peleg**

Claim 1 stands rejected under 35 U.S.C §102(e) as purportedly being anticipated by U.S. Patent No. (Peleg). Applicants respectfully traverse this rejection.

Claim 1 has been amended as shown above to recite:

“A method of classifying material, wherein a number of potential classifications are available, the method comprising acts of:

- (A) detecting x-rays fluoresced from the material;
- (B) detecting optical emissions **emitted from a plasma resulting from a vaporization of a portion of the material**; and
- (C) classifying the material based on the detected x-rays and the detected optical emissions, including acts of
  - (1) **reducing the number of potential classifications by analyzing only a first one of two types of emissions: the detected x-rays or the detected optical emissions**; and
  - (2) **selecting one of the reduced number of classifications by analyzing only a second one of the two types of emissions that was not analyzed in the act (C)(1).**” [emphasis added]

Peleg does not disclose or suggest “detecting optical emissions emitted from a plasma resulting from a vaporization of a portion of the material”. The Office Action contends that “Peleg discloses using a laser beam to penetrate the inspected object and later describes when self-emitting objects are inspected[;] inspection stations (5) and (6) may comprises detecting devices, for classification by the emitted radiation (See Col. 8 l.18-20, 24-29).” Applicants disagree.

Firstly, although Peleg mentions that lasers (and X-rays and Y-rays) may be employed as radiation sources, Peleg does not teach or suggest that the laser can be used to penetrate an inspected object, as contended in the Office Action. Neither does Peleg teach or suggest that the laser is used to vaporize a portion of the object to produce a plasma. In fact, Peleg, makes only a single mention of lasers and is otherwise silent regarding how a laser may be used. Further, the self-emitting objects referred to in Peleg are *radioactive* sources that emit x-rays, not optical emissions from a plasma, much less optical emissions from a plasma resulting from a vaporization of a portion of the object.

Peleg also does not disclose “classifying the piece based on the detected x-rays and the detected optical emissions, including acts of (1) reducing the number of potential classifications

by analyzing only a first one of two types of emissions: the detected x-rays or the detected optical emissions; and (2) selecting one of the reduced number of classifications by analyzing only a second one of the two types of emissions that was not analyzed in the act (C)(1), as recited in claim 1.

In rejecting claim 13, which previously recited somewhat similar limitations, the Office Action conceded that Peleg does not teach or suggest such an act of classifying. Nonetheless, the Office Action asserted that it would have been obvious to modify the teaching of Peleg with the teachings of U.S. Patent No. 6,753,957 (Graft), which teaches sorting samples using optical emissions resulting from laser-induced breakdown spectroscopy (LIBS). Applicants disagree.

The combination of Peleg and Graft is improper because, at the time of the invention, one of skill in the art would not have been motivated to combine Peleg and Graft as asserted in the Office Action. The Office Action points to no teaching or suggestion in Peleg for augmenting its system with LIBS. Neither does the Office Action specify the teaching or suggestion in Graft for modifying a sorting system that uses x-rays with its teachings about using LIBS for sorting samples. Thus, neither reference provides the requisite motivation for combining the analysis of detected x-rays and optical emissions, much less the motivation for combining the analysis of detected x-rays and optical emissions in the manner required by claim 1. Of course, the motivation to combine need not come from the two references, and can otherwise be known to one skilled in the art, but the Office Action does not provide a factual basis for concluding that the required motivation was, in fact, known to those of skill in the art.

Lastly, Grodzins (cited in the enclosed IDS) also does not teach or suggest “classifying the piece based on the detected x-rays and the detected optical emissions, including acts of (1) reducing the number of potential classifications by analyzing only a first one of two types of emissions: the detected x-rays or the detected optical emissions; and (2) selecting one of the reduced number of classifications by analyzing only a second one of the two types of emissions that was not analyzed in the act (C)(1)”, as recited in claim 1.

Grodzins discloses a process using x-rays and optical signals for identifying the elemental composition of a sample; however, Grodzins describes identifying or classifying a sample using the x-rays alone (e.g., as carbon steel), and using the optical signals to determine the precise

elemental composition of the lighter elements (col. 5, lines 28-65; Fig. 3), not reducing a potential number of classifications and then selecting from the reduced number of classifications, as required by claim 1.

In view of the foregoing, claim 1 patentably distinguishes over the art of record, including Peleg, Graft and Grodzins. Accordingly, the rejection of claim 1 as being anticipated by Peleg should be withdrawn. Claims 2-9, 13-21 and 26-30 each depend from claim 1 and are patentable for at least the same reasons.

**4. Claims 22-25 Patentably Distinguish Over Peleg**

Claims 22-25 are patentably distinct from one another and claim 1, and each are patentable over the art for different reasons than each other and claim 1. These reasons should be clear from the discussion of the asserted art set forth above in Section 3. Accordingly, Applicants respectfully request that the rejections of claims 22-25 as being anticipated by Peleg under §102(e) be withdrawn.

**5. Claims 38-44 Patentably Distinguish Over the Art of Record**

New claim 38 recites:

“A method of classifying material in a moving stream of materials, comprising acts of:  
(A) detecting x-rays fluoresced from the material as the material moves;  
(B) detecting optical emissions emitted from a plasma resulting from a vaporization of a portion of the material as the material moves; and  
(C) classifying the material based on the detected x-rays and/or the detected optical emissions, including  
(1) creating one or more emissions spectra from the detected x-rays and detected optical emissions; and  
(2) **estimating peak values for one or more regions of interest of the one or more spectra.**” [emphasis added]

The prior art of record, including Peleg, Graft and Grodzins, does not teach or suggest all of the limitations of the method recited in claim 38, including “estimating peak values for one or more regions of interest of the one or more spectra”. In rejecting claim 20, the Office Action conceded that Peleg did not teach this limitation.

Nonetheless, the Office Action asserted that it would be obvious to combine Peleg with Graft to produce a system that includes this limitation. Applicants disagree.

For reasons set forth above, the combination of Peleg and Graft is improper. Even if the combination were proper (which it is not), claim 38 would still distinguish over such combination. As conceded in the Office Action, Peleg does not teach this limitation. Further, Graft fails to remedy this deficiency. The Office Action contends that Graft teaches estimating peak values for one or more regions of interest of the one or more spectra at col. 6, lines 7-16. Even though this cited passage discusses measuring emission signals, calculating their ratios and identifying fractions, it does not teach or suggest estimating peak values of anything, let alone estimating peak values of one or more regions of interest. Thus, even if Graft and Peleg were combined, the resulting system would not employ a method of classifying a piece of material that includes the act of estimating peak values required by claim 38.

Grodzins fails to remedy these deficiencies of Peleg and Graft. Thus, the art of record fails to recognize or utilize the benefits of estimating peak values of regions of spectra to classify a piece of material, in particular for immature spectra and at high speeds, as described in Applicants' specification on page 42, lines 4-13.

In view of the foregoing, claim 38 and its dependent claims 39-45 patentably distinguish over the art of record.

#### **6. New Claims 45-52 Patentably Distinguish Over the Art of Record**

New claim 45 recites:

"A method of classifying material, the method comprising acts of:

- (A) **applying an electrical discharge to vaporize a portion of the material to produce a plasma;**
- (B) detecting optical emissions emitted from the plasma;
- (C) detecting x-rays fluoresced from the material; and
- (D) classifying the material based on the detected x-rays and/or the detected optical emissions." [emphasis added]

None of the art of record, including Peleg, Graft and Grodzins, teaches or suggests a method of classifying a piece of materials, comprising, *inter alia*, applying an electrical discharge to vaporize a portion of the material to produce a plasma.

In view of the foregoing, claim 45 and its dependent claims 46-52 patentably distinguish over the art or record.

7. **New Claims 53-61 Patentably Distinguish Over the Art of Record**

New claim 53 recites:

“An automated method of sorting material in a stream of materials presented for sorting, comprising acts of:

- (A) detecting x-rays fluoresced from the material as it moves;
- (B) detecting optical emissions emitted from a plasma resulting from a vaporization of a portion of the material as it moves;
- (C) classifying the material based on at least one of: the detected x-rays, and the detected optical emissions; and
- (D) based on the classification, sorting the material by removing the material from the stream to a location associated with the classification.”

Claim 53 patentably distinguishes over Peleg for reasons that should be clear from the discussion of Peleg set forth above in Section 3. Namely, Peleg does not teach or suggest a method of automated sorting of material in a stream of materials presented for sorting, comprising, *inter alia*, detecting optical emissions emitted from a plasma resulting from a vaporization of a portion of the material as the material moves”.

Further, claim 53 is clearly patentable over Grodzins because Grodzins does not teach or suggest conveying and sorting, but rather is specifically designed for hand-held use when analyzing a stationary sample.

Lastly, for reasons that should be clear from discussions set forth above, there is no motivation or suggestions to modify and/or combine any of the art of record, including Peleg, Grodzins and/or Graft, to produce a system employing the method of claim 53. The only motivation for doing so is found in Applicants’ specification, use of which is improper hindsight analysis.

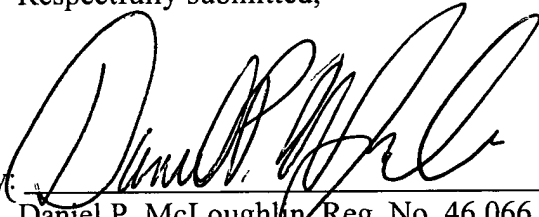
In view of the foregoing claims 53 and its dependent claims 54-61 patentably distinguish over the art of record.

**CONCLUSION**

A Notice of Allowance is respectfully requested. The Examiner is requested to call the undersigned at the telephone number listed below if this communication does not place the case in condition for allowance.

If this response is not considered timely filed and if a request for an extension of time is otherwise absent, Applicant hereby requests any necessary extension of time. If there is a fee occasioned by this response, including an extension fee, that is not covered by an enclosed check, please charge any deficiency to Deposit Account No. 23/2825.

Respectfully submitted,

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Date: February 27, 2006  
**X02/27/06X**



Serial No 10/766,298 File No: S1404:70004US01 By: DPM

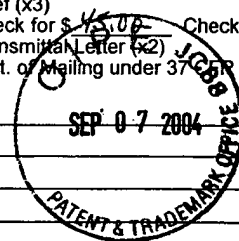
Title: SORTING PIECES OF MATERIAL BASED ON PHOTONIC EMISSIONS RESULTING FROM MULTIPLE SOURCES OF STIMULI

Application of DAVID SPENCER WGS Date: NDD

The U.S. PTO Mail Room acknowledges receipt of the following on the date stamped hereon:

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| <input type="checkbox"/> Mailing by Express Mail (37 CFR 1.10)   | <input type="checkbox"/> Provisional Application Cover Sheet                       |
| <input type="checkbox"/> Express Mail Label No. _____  | <input type="checkbox"/> Multiple Dependent Claim Fee Sheet                        |
| <input type="checkbox"/> Patent Application  | <input type="checkbox"/> Inf. Discl. Statement, PTO Form 1449                      |
| <input type="checkbox"/> <input type="checkbox"/> Non-provisional <input type="checkbox"/> Provisional | <input type="checkbox"/> References Cited  |
| Incl. _____ pages, ( _____ pgs) Specification,   | <input type="checkbox"/> Priority Document(s) # _____                              |
| ( _____ pgs) Abstract, ( _____ pgs) Claims ( _____ # claims)   | <input type="checkbox"/> Copy of Notice to File Missing Parts                      |
| <input type="checkbox"/> Design Patent Application   | <input checked="" type="checkbox"/> Amendment/Response <u>PRELIMINARY</u>          |
| <input type="checkbox"/> Declaration(s)  | <input type="checkbox"/> Petition for Ext. of Time (x2)                            |
| <input type="checkbox"/> Drawings _____ Sheet(s) (FIGS. _____)   | <input type="checkbox"/> Issue Fee Transmittal                                     |
| <input type="checkbox"/> <input type="checkbox"/> Formal <input type="checkbox"/> Informal             | <input type="checkbox"/> Letter to Official Draftsperson                           |
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| <input type="checkbox"/> Fee calculation sheet (x2)  | <input type="checkbox"/> Brief (x3)  |
| <input type="checkbox"/> CPA Transmittal   | <input checked="" type="checkbox"/> Check for \$ <u>45.00</u> Check # <u>20825</u> |
| <input type="checkbox"/> Verified Statement claiming small entity status                               | <input checked="" type="checkbox"/> Transmittal Letter (x2)                        |
| <input type="checkbox"/> Assignment and Cover Sheet  | <input checked="" type="checkbox"/> Cert. of Mailing under 37 CFR 1.8(a)           |
| <input type="checkbox"/> Other _____   |  |

DATE MAILED 9-3-2004





DOCKET NO.: S1404.70004US01

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE


Applicant: David Spencer  
Serial No.: 10/766,298  
Confirmation No.: 9344  
Filed: January 27, 2004  
For: SORTING PIECES OF MATERIAL BASED ON  
PHOTONIC EMISSIONS RESULTING FROM MULTIPLE  
SOURCES OF STIMULI

Examiner: Not yet assigned  
Art Unit: 2882

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CERTIFICATE OF MAILING UNDER 37 C.F.R. §1.8(a)

The undersigned hereby certifies that this document is being placed in the United States mail with first-class postage attached, addressed to MAIL STOP AMENDMENT, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on the 3rd day of September, 2004.

  
Signature

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MAIL STOP AMENDMENT  
Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

**COPY**

**PRELIMINARY AMENDMENT**

Sir:

Before the first action in this application, please enter the following preliminary amendment.

**Amendments to the Claims** are reflected in the listing of claims that begins on page 2 of this preliminary amendment.

**Remarks** begin on page 7 of this preliminary amendment.

**In the Claims**

Applicant submits below a complete listing of the current claims.

Please add new claims 26-30 as shown below.

**Listing of the Claims**

1. (Original) A method of classifying a piece of material, comprising acts of:
  - (A) detecting x-rays fluoresced from the piece;
  - (B) detecting optical emissions emitted from the piece; and
  - (C) classifying the piece based on at least one of: the detected x-rays, and the detected optical emissions.
2. (Original) The method of claim 1, further comprising an act of:
  - (D) irradiating the piece with x-ray photons to cause the piece to fluoresce the fluoresced x-rays.
3. (Original) The method of claim 2, further comprising an act of:
  - (E) vaporizing a portion of the piece to produce a plasma that emits the optical emissions.
4. (Original) The method of claim 3, further comprising an act of:
  - (F) conveying the piece into an area in which acts (A), (B), (D) and (E) are performed.
5. (Original) The method of claim 4, further comprising an act of:
  - (G) conveying the piece out of the area in which acts (A), (B) (D) and (E) are performed.
6. (Original) The method of claim 5, further comprising an act of:
  - (H) sorting the piece based on the classification.

7. (Original) The method of claim 1, further comprising an act of:
  - (D) vaporizing a portion of the piece to produce a plasma that emits the optical emissions.
8. (Original) The method of claim 7, wherein act (D) includes vaporizing the portion of the piece using a laser beam.
9. (Original) The method of claim 7, wherein act (D) includes vaporizing the portion of the piece using an electrical discharge.
10. (Original) The method of claim 1, wherein the act (C) includes classifying the piece based on the detected x-rays.
11. (Original) The method of claim 1, wherein the act (C) includes classifying the piece based on the detected optical emissions.
12. (Original) The method of claim 1, wherein the act (C) includes classifying the piece based on the detected x-rays and the detected optical emissions.
13. (Original) The method of claim 1, wherein a predetermined number of potential classifications are available, and wherein the act (C) includes acts of:
  - (1) analyzing only the detected optical emissions to reduce the predetermined number to a reduced number of potential classifications; and
  - (2) classifying the piece of material as one of the reduced number of classifications based on the detected x-rays.
14. (Original) The method of claim 13, wherein act (C)(1) includes determining that a threshold percentage of the collected optical emissions were emitted by one or more particular elements included within the piece.

15. (Original) The method of claim 14, wherein at least one of the one or more particular elements is a low-Z element.
16. (Original) The method of claim 15, wherein at least one of the one or more particular elements is aluminum.
17. (Original) The method of claim 13, wherein the reduced number of classifications represent a number of alloys belonging to a same alloy group.
18. (Original) The method of claim 17, wherein the alloy group is an aluminum alloy group.
19. (Original) The method of claim 1, wherein a predetermined number of potential classifications are available, and wherein the act (C) includes acts of:
  - (1) analyzing only the detected x-rays to reduce the predetermined number to a reduced number of potential classifications; and
  - (2) classifying the piece of material as one of the reduced number of classifications based on the detected optical emissions.
20. (Original) The method of claim 1, wherein act (C) includes:
  - (1) creating one or more emissions spectra from the detected x-rays and detected optical emissions; and
  - (2) estimating peak values for one or more regions of interest of the one or more spectra.
21. (Original) The method of claim 20, wherein act (C)(2) includes applying a shape fitting function to data corresponding to the one or more regions of interest.
22. (Original) A system for classifying a piece of material, comprising:  
a classification module to receive x-ray fluorescence information representing x-rays fluoresced from the piece, to receive optical emissions information representing optical

emissions emitted from the piece, and to classify the piece based on at least one of the x-ray fluorescence information and the optical emissions information.

23. (Original) The system of claim 22, further comprising:  
an x-ray detector to detect the x-rays fluoresced from the piece;  
an optical emissions collector to detect the optical emissions emitted from the piece.
24. (Original) A system for classifying a piece of material, comprising:  
one or more inputs to receive x-ray fluorescence information representing x-rays fluoresced from the piece and optical emissions information representing optical emissions emitted from the piece; and  
means for classifying the piece based on at least one of the x-ray fluorescence information and the optical emissions information.
25. (Original) A computer-readable medium having computer-readable signals stored thereon that define instructions that, as a result of being executed by a computer, control the computer to perform a method of classifying a piece of material, the method comprising acts of:
- (A) detecting x-rays fluoresced from the piece;
  - (B) detecting optical emissions emitted from the piece; and
  - (C) classifying the piece based on at least one of: the detected x-rays, and the detected optical emissions.
26. (New) The method of claim 5, wherein the act (F) includes conveying the piece on a first conveyor, and the act (G) includes conveying the piece on a second conveyor distinct from the first conveyor.
27. (New) The method of claim 26, wherein the act (A) is performed while the piece passes from the first belt to the second belt.

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28. (New) The method of claim 26, wherein the act (B) is performed while the piece passes from the first belt to the second belt.

29. (New) The method of claim 26, wherein the act (D) is performed while the piece passes from the first belt to the second belt.

30. (New) The method of claim 26, wherein the act (E) is performed while the piece passes from the first belt to the second belt.

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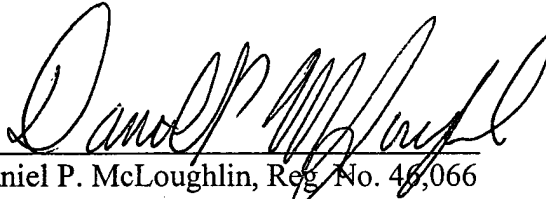
Art Unit: 2882

**REMARKS**

Prior to examination on the merits, Applicant requests entry of the above Amendment. If this amendment is not considered timely filed and if a request for an extension of time is otherwise absent, Applicant hereby requests any necessary extension of time. If there is a fee occasioned by this response, including an extension fee, that is not covered by an enclosed check, please charge any deficiency to Deposit Account No. 23/2825.

Respectfully submitted,  
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